Sub B1 C1

15. (New) The vacuum seal of claim 6 consisting essentially of said nested inner and outer members and at least one plating layer.

16. (New) The vacuum seal of claim 13 consisting essentially of said nested inner and outer members and at least one plating layer.

A3

17. (New) The vacuum seal of claim 13 wherein the inner member comprises a nickel-based superalloy and the outer member comprises an aluminum-based material.

18. (New) The vacuum seal of claim 13 wherein the outer member has a pair of oppositely-directed, longitudinally outward-projecting, ridges for deformably engaging the first and second opposed flanges.

19. (New) The seal of claim 13 wherein the outer member is thickest along each of the ridges. --

REMARKS

In the present Office Action, claims 1-13 were pending and at issue. No claims have been withdrawn from consideration. Claims 1-13 were rejected, no claims were objected to, and no claims were allowed.

By this Amendment, no claims have been amended, no claims have been canceled, and claims 14-19 have been added. Accordingly, claims 1-19 are presented and at issue. No new matter has been added. By this Amendment, claims 1-19 are believed to be in condition for allowance.

The Drawings

The Examiner objected to the drawings asserting that "element D_2 in figure 1 is not described in the specification" and "elements [sic] S_0, is not described in the description of Figure 1. Element S_0 is described only for Figure 5."

By the foregoing Amendment, the specification has been amended to identify the diameter D_2 and span S_0 in FIG. 2. Accordingly, no drawing correction is believed necessary

to FIG. 1. Reconsideration and withdrawal of the Examiner's objection to the drawings is respectfully requested.

The Specification

The Examiner noted 37 CFR 1.77(b).

No statutory or other ground of rejection was identified. Accordingly, no amendment is believed required in response.

Rejections under 35 USC §102

The Examiner rejected claims 6, 8, 9, and 13 under 35 U.S.C. §102(b) as being anticipated by US Pat. No. 4,218,067 of Halling. Applicant respectfully traverses this rejection.

The Examiner asserted that Halling "comprises an outer metallic annular member (16), having a c-shaped cross section, and an inner metallic annular member (14), having a c-shaped cross section, and an inner metallic annular member." Office Action, page 3, last paragraph. As the Examiner has twice referenced "inner metallic annular member," it is not clear how the Examiner is applying Halling to the present claims. The second recitation is assumed to reference element 12 of Halling. Present claims 6 and 13 reference both the inner and outer members as being "open radially outward." In FIG. 1 of Halling, only element 12 is open radially outward.

Regarding claim 9, the Examiner has cited no basis for the specific claimed leakage rate.

Rejections under 35 USC §103

The Examiner rejected claims 1-5, 7, and 10-12 under 35 U.S.C. §103(a) as being obvious and unpatentable over Halling in view of US Pat. No. 4,561,662 of de Villepoix et al. Applicant respectfully traverses this rejection.

This rejection had the same indefiniteness regarding the inner metallic annular member as did the rejection under §102.

De Villepoix et al. was asserted as teaching "outwardly projected ridges (20)." The ridges were asserted as having "a longitudinal extend [sic] beyond the thickness of the outer member away from the ridges." Office Action, pages 4-5. De Villepoix et al., however, shows machined ridges in a relatively thick "outer envelope 16." The height of these ridges

is, if anything, equal to or less than the thickness in the majority of the material which remains unmachined. There is clearly no suggestion as to how such machining of a relatively thick member would be applied to the relatively thin coating of Halling.

The Examiner asserted de Villepoix et al. as teaching "the use of a cooper [sic] material has [sic] plating for an inner member..." Office Action, page 5, second paragraph. However, the cited section of de Villepoix et al. identifies that material in the "envelopes surrounding the core of existing joints are made from plated material or thin sheets..." Col. 1, lines 31-33. Clearly this is directed to seals in which the identified plated material does not provide the "longitudinal strength and elasticity..." as specified in claim 1 but rather such are provided by the identified core.

In referencing claims 2 and 3, the confusion regarding the nature of Halling's inner member is highlighted. In claim 2, the Examiner asserts that "the inner member provides the primary structural integrity of the seal." Office Action, page 5. However, in claim 3 the Examiner asserts that "Halling discloses that the thickness of the inner member (14) is about 2 to 4 times greater than the thickness of the outer member (16)." Office Action, page 5. Clearly Halling identifies that the "inner ply 12" provides such structural integrity asserting that it is "heat-treated to achieve the desired load and spring back characteristics for the sealing ring." Col. 3, lines 59-60. In the sentence spanning columns 3 and 4 of Halling, element 12 is identified as substantially thicker than element 14 further confirming the structural role of element 12. Regarding claim 3, although the ratio of the thickness of a silver plating as element 16 to the thickness of element 14 falls within the range of a ratio of 4.3 to 1 to 6 to 1, the ratio for an aluminum jacket a element 16 is 1 to 1.

As to claims 11 and 12, the Examiner's assertion of "a similar method" in Halling is insufficient. Halling clearly fails to show a number of features, not the least of which are claim 12's roll forming of ridges and claim 11's flat lapping of ridges. Such roll forming is clearly also not shown by the machining of de Villepoix et al.

Regarding the added claims, dependent claims 14-16 recite seals consisting essentially of inner and outer members and at least one plating layer. Support for this may be found, *inter alia*, in claim 13 as filed which comprehends the possibility of relevant plating layers but does not require them. Dependent claim 17 is supported by present claim 8. Dependent claim 18 is supported by present claim 1. Dependent claim 19 is supported by present claim 5 and Fig. 2.

Accordingly, Applicant submits that none of the references, alone or in combination, anticipate or make obvious the invention as presently claimed. Applicant submits that the application is now in condition for allowance. Therefore, Applicant respectfully requests reconsideration and further examination of the application and the Examiner is respectfully requested to take such proper actions so that a patent will issue herefrom as soon as possible.

If the Examiner has any questions or believes that a discussion with Applicant's attorney would expedite prosecution, the Examiner is invited and encouraged to contact the undersigned at the telephone number below.

Please apply any credits or charge any deficiencies to our Deposit Account No. 23-1665.

Respectfully submitted,
D. Gregory More et al.

Date: Dec 24, 2002

Michael K. Kinney, Reg. No. 42,740
Attorney for Applicant
Direct: (203) 498-4411
Email: mkinney@wiggin.com

Wiggin & Dana LLP
One Century Tower
P.O. Box 1832
New Haven, CT 06508-1832
(203) 498-4400
(203) 782-2889 Fax

\1990\30\378927.1

MARKED UP VERSION OF AMENDMENTS TO THE SPECIFICATION

Please amend the paragraph spanning pages 2 and 3 as follows.

FIG. 1 shows a vacuum seal 20 for maintaining a seal between first and second opposed flanges (not shown) to maintain an internal pressure less than an external pressure. The seal is of generally annular configuration, being angularly symmetric about a central longitudinal axis 500. When viewed in longitudinal radial section (*i.e.*, along a central longitudinal plane 501 outward from the axis 500) the seal is generally c-shaped and open radially outward (FIG. 2). The seal is substantially symmetric about a transverse centerplane 502. The seal has nested inner and outer members or jackets 22 and 24, respectively. Both are generally c-shaped and open radially outward. The inner member has inner and outer surfaces 26 and 28 joined by edge surfaces 30A and 30B. The outer member has inner and outer surfaces 32 and 34, respectively. In FIG. 2, a line 503 (a cylindrical construct <u>of diameter D_2</u> when not viewed in cross-section) designates the radial location of the maximum longitudinal span of the inner member 22. Proximate the annular ends of the outer member 24, the outer member includes longitudinally-projecting protuberances 40A and 40B which provide annular ridges. These protuberances project slightly beyond the adjacent portions of the outer surface 34. The longitudinal extremities 42A and 42B of the ridges 40A and 40B engage the adjacent flanges 100A and 100B (FIG. 3) to form a seal and may be exactly or nearly coaligned with the line 503. The outer member 24 need not extend substantially radially beyond the line 503. Viewed relative to the intersection of the line 503 and plane 502, this may be from a few degrees to about 20 degrees beyond the line 503. The inner member advantageously extends slightly farther therebeyond, e.g., to an exemplary 30° beyond the line 503. The inner member 22 provides the primary structural integrity of the seal and is formed of a material and with dimensions effective to maintain compressive engagement with the flanges. This will be achieved by making the inner member substantially thicker than the outer member. A preferred material for the inner member is sold by INCO Alloys International, Inc. under the trademark INCONEL Alloy 718. Other "superalloys" having a nickel base and significant amounts of iron and chromium (for corrosion resistance) may also provide advantageous performance. High strength, high gall-resistance stainless steels such as that sold under trademark ULTIMET by Haynes International, Inc. of Kokomo, IN may also be used. A preferred material for the outer jacket

is aluminum 1100 (99.0% Al minimum), a substantially pure aluminum. Various aluminum alloys may also be utilized as can other ductile metals.

Please amend the paragraph spanning pages 3 and 4 as follows.

In an exemplary nominal three inch (7.62 cm) diameter seal (measured as a minimum diameter D_1 of the longitudinal opening within the outer member 24 at the plane 502) the inner member may have a relaxed longitudinal length L_2 of about 0.16 inches (0.41 cm) and a thickness of about 0.024 inches (0.061 cm). A broader thickness range is 0.015-0.035 inches (0.038-0.089 cm). The ridges may have a longitudinal extent L_3 of about 0.005 inch (0.013 cm). A thickness of the outer member (away from the ridges) may be about 0.01 inches (0.025 cm), a thickness well under half the exemplary thickness of the inner member. A broader thickness range is 0.005-0.020 inches (0.0123-0.051 cm). The radial extent or span S_1 of the outer member may be about 0.10 inches (0.25 cm). <u>A radial span S_0 of the exemplary seal is the radial span of the inner member plus the thickness of the outer member at the plane 502</u>. The ridge extremities 42A and 42B form a pair of flat annuli with a radial span S_3 of about 0.006 inches (0.015 cm). The longitudinal span L_1 of the outer member at the line 503 between the extremities 42A and 42B may be an exemplary 0.19 inch (0.48 cm). When compressed between opposed flat annular surfaces 102A and 102B of flanges 100A and 100B, the ridges are both plastically and elastically deformed to form a seal and the inner member is plastically and elastically longitudinally compressed (e.g., by about 0.044 inch (0.11 cm) so that compressed overall and inner member lengths L_1' and L_2' are about 0.16 inch (0.41 cm) and 0.14 inch (0.36 cm) to bias the ridges into engagement with the flanges. An exemplary compressive engagement force on the seal is 400-1000 lbs/inch (7-17.5 N/m) of contact length (seal circumference at the ridges).